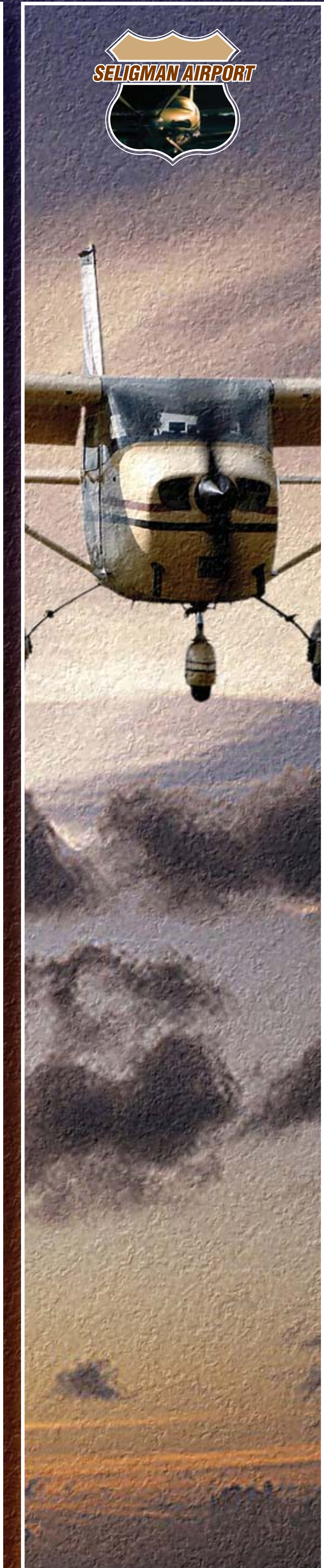
SELIGMAN AIRPORT

Chapter Three

FACILITY REQUIREMENTS

FACILITY REQUIREMENTS



To properly plan for the future of Seligman Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities that can adequately serve this identified demand. This chapter uses the results of the forecasts conducted in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., hangars, aircraft parking apron, and automobile parking) facility requirements.

The objective of this effort is to identify, in general terms, the adequacy of the existing airport facilities, outline what new facilities may be needed, and when these may be needed to accommodate forecast demands. Having established these facility requirements, alternatives for providing these facilities will be evaluated in Chapter Four, to determine the most cost-effective and efficient means for implementation.

PLANNING HORIZONS

The cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on a time-based forecast figure. In order to develop a master plan that is demand-based rather than time-based, a series of planning horizon milestones has been established for Seligman Airport, that take into consideration the reasonable range of aviation demand projections prepared in Chapter Two.

It is important to consider that the actual activity at the airport may be higher or lower than projected activity levels. By planning according to

activity milestones, the resultant plan can accommodate unexpected shifts or changes in the area's aviation demand. It is important that the plan accommodate these changes so that Yavapai County can respond to unexpected changes in a timely fashion. These milestones provide flexibility, while potentially extending this plan's useful life if aviation trends slow over time.

The most important reason for utilizing milestones is that they allow the airport to develop facilities according to need generated by actual demand levels. The demand-based schedule provides flexibility in development, as development schedules can be slowed or expedited according to actual demand at any given time over the planning period. The resultant plan provides airport officials with a financially responsible and need-based program. **Table 3A** presents the planning horizon milestones for each aircraft activity category. The planning milestones essentially correlate to the five, ten, and twenty-year periods used in the previous chapter.

TABLE 3A
Planning Horizons

	Short Term	Intermediate Term	Long Term
OPERATIONS			
Itinerant	2,400	4,000	6,000
Local	3,600	6,000	9,000
TOTAL OPERATIONS	6,000	10,000	15,000
Annual Instrument Approaches	48	80	120
Total Based Aircraft	2	4	10

In this chapter, existing components of the airport are evaluated so that the capacities of the overall system are identified. Once identified, the existing capacity is compared to the planning horizon milestones to determine where deficiencies currently exist or may be expected to materialize in the future. Once deficiencies in a component are identified, a more specific determination of the approximate sizing and timing of the new facilities can be made.

AIRFIELD REQUIREMENTS

Airfield requirements include the need for those facilities related to the arrival and departure of aircraft. The adequacy of existing airfield facilities at Seligman Airport has been analyzed from a number of perspectives, including airfield capacity, runway length, runway pavement strength, airfield lighting, navigational aids, and pavement markings. The components include:

- Airfield Design Standards
- Airfield Capacity
- Runways
- Taxiways
- Navigational Approach Aids
- Airfield Lighting, Marking, and Signage

AIRFIELD DESIGN STANDARDS

The selection of appropriate Federal Aviation Administration (FAA) and Arizona Department of Transportation (ADOT) - Aeronautics Division design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use, the airport. Planning for future aircraft use is of particular importance since design standards are used to plan separation distances between facilities. These standards must be determined now since the relocation of these facilities will likely be extremely expensive at a later date.

The FAA has established a coding system to relate airport design criteria to the operational and physical characteristics of aircraft expected to use the airport. This code, the airport reference code (ARC), has two components: the first component, depicted by a letter, is the aircraft approach speed (operational characteristic); the second component, depicted by a Roman numeral, is the airplane design group and relates to aircraft wingspan (physical characteristic). Generally, aircraft approach speed applies to runways and runway-related facilities, while aircraft wingspan primarily relates to separation criteria involving taxiways, taxilanes, and landside facilities. **Exhibit 3A** depicts typical aircraft within each ARC.

According to FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, an aircraft's approach category is based upon 1.3 times its stall speed in landing configuration, at that aircraft's maximum certificated weight. The five approach categories used in airport planning are as follows:

Category A: Speed less than 91 knots.
Category B: Speed 91 knots or more, but less than 121 knots.
Category C: Speed 121 knots or more, but less than 141 knots.
Category D: Speed 141 knots or more, but less than 166 knots.
Category E: Speed greater than 166 knots.

The airplane design group (ADG) is based upon the aircraft's wingspan. The six ADGs used in airport planning are as follows:

Group I: Up to but not including 49 feet.
Group II: 49 feet up to but not including 79 feet.
Group III: 79 feet up to but not including 118 feet.
Group IV: 118 feet up to but not including 171 feet.
Group V: 171 feet up to but not including 214 feet.
Group VI: 214 feet or greater.

In order to determine facility requirements, an ARC should first be determined, then appropriate airport design criteria can be applied. This begins with a review of the type of aircraft using and expected to use Seligman Airport.

The FAA recommends designing airport functional elements to meet the requirements of the most demanding ARC for that airport. It is important to note that the FAA has established 500 annual operations as the threshold for defining an airport's critical aircraft. This threshold is used to establish justification (for State or Federal funding assistance) for airport improvement projects aimed at accommodating the critical aircraft. For some airports, however, other means of identifying critical aircraft can be used, such as identifying aircraft basing at the airport that may not reach the 500 annual operational level.

Critical Aircraft

Seligman Airport is currently designed to meet ARC B-I standards. This design standard corresponds to both the airport's based aircraft and itinerant aircraft operators. Currently, the airport has one based, single engine aircraft. As discussed in the previous chapter, the airport is also utilized by aircraft from Embry Riddle Aeronautical University (ERAU). These are typically flight training operations conducted in single or multi-engine piston aircraft within ARC B-I. Thus, the current design meets the needs of the airport's current critical aircraft.

Defining the future critical aircraft can sometimes be a difficult task. Typically, the design aircraft is based upon the most demanding aircraft actually based at the airport. For airports similar to Seligman Airport, the critical aircraft can be defined by a group of similar aircraft which operate at the airport on a regular basis.

Future aircraft mix can expect to include a larger percentage of aircraft falling in Group II, however, still within approach category B. The primary role of the Seligman Airport is, and will continue to be, to serve general aviation aircraft operations, especially those within ARC B-I. Given its remote location, however, the Seligman Airport should also be designed to accommodate medical evacuation flights when necessary. Many times, rotorcraft are used. For Seligman and the surrounding communities, however, turboprop or small jet aircraft from Flagstaff could be used for expediency. In many cases the aircraft of choice is the Beechcraft King Air. The King Air is an ARC B-II airplane (except for the 350 model). These aircraft are based in Flagstaff and utilized by two medical evacuation operators. In some cases, small business jets are used, such as Cessna Citations which also fall within ARC B-II (except for the X model). Planning for ARC B-II may also be useful in aiding community development as it would allow availability for corporate operators within ARC B-II to utilize the airport.

Given all of these considerations, ultimate planning should conform to full ARC B-II standards, to meet the needs of small business jets (e.g., Cessna Citations or those weighing less than 30,000 pounds), and especially for medical emergency evacuation aircraft

02MP20-3A-12/17/03

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Piper Archer
- Piper Seneca

C-I, D-I

- **Lear** 25, **35**, 55
- Israeli Westwind
- HS 125

B-I less than 12,500 lbs.

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I

C-II, D-II

- **Gulfstream** II, III, **IV**
- Canadair 600
- Canadair Regional Jet
- Lockheed JetStar
- Super King Air 350

B-II less than 12,500 lbs.

- **Super King Air 200**
- Cessna 441
- DHC Twin Otter

C-III, D-III

- Boeing Business Jet
- B 727-200
- **B 737-300 Series**
- MD-80, DC-9
- Fokker 70, 100
- A319, A320
- Gulfstream V
- Global Express

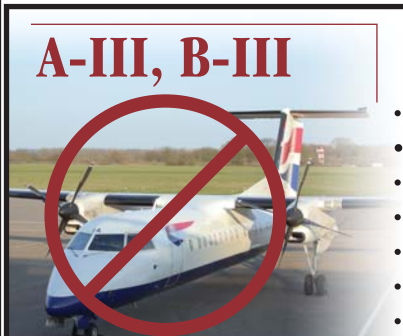
B-I, II over 12,500 lbs.

- Super King Air 300
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- **Citation** II, **III**, IV, V
- Saab 340
- Embraer 120

C-IV, D-IV

- **B-757**
- B-767
- DC-8-70
- DC-10
- MD-11
- L1011

A-III, B-III



- DHC Dash 7
- **DHC Dash 8**
- DC-3
- Convair 580
- Fairchild F-27
- ATR 72
- ATP

D-V

- **B-747** Series
- B-777

Note: Aircraft pictured is identified in bold type.

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Exhibit 3A
AIRPORT REFERENCE CODES

up to and including the Beechcraft King Air 200 and Pilatus aircraft. Analysis presented in the following sections will consider the runway lengths required by both B-II aircraft.

The airfield facility requirements outlined in this chapter correspond to the design standards described in the *FAA's Advisory Circular 150/5300-13, Change 7, Airport Design*. The following airfield facilities are outlined to describe the scope of facilities that would be necessary to accommodate the airport's role throughout the planning period.

AIRFIELD CAPACITY

A demand/capacity analysis measures the capacity of the airfield facilities (i.e., runways and taxiways) in order to identify and plan for additional development needs. The capacity of the airport's airfield can provide up to 230,000 annual operations. FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, indicates that improvements should be considered when operations reach 60 percent of the airfield's annual service volume (ASV). The FAA also suggests that airports implement capacity-enhancing projects once operations reach 80 percent of the airports ASV.

If the projected long range planning horizon's level of operations comes to fruition, the airfield ASV will not exceed the 60 percent level. In fact, the long term operational projection would remain below 10 percent of the airfield's approximate ASV. For this reason, planning will not include airfield capacity improvements.

RUNWAYS

The adequacy of the existing runway system at Seligman Airport has been analyzed from a number of perspectives, including runway orientation, runway length, pavement strength, width, and safety standards. From this information, requirements for runway improvements were determined for the airport.

Runway Orientation

The airfield configuration includes Runway 4-22, oriented in a northeast-southwest manner. Ideally, the primary runway should be oriented as close as practical in the direction of the predominant wind, to maximize the runway's usage. This minimizes the percent of time that a crosswind could make the preferred runway inoperable.

FAA Advisory Circular 150/5300-13, Change 7, Airport Design, recommends that a crosswind runway should be made available when the primary runway orientation provides for less that 95 percent wind coverage for any aircraft forecast to use the airport on a regular basis. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding 10.5 knots (12 mph) for Airport Reference Codes (ARC) A-I and B-I; 13 knots (15 mph) for ARC A-II and B-II; 16 knots (18 mph) for ARC C-I through D-II; and 20 knots for ARC A-IV through D-VI.

Wind data specific to the airport was not available. There are three weather reporting stations which could be considered for use at Seligman, however, each is fairly distant. The three stations are located at Flagstaff, Prescott, and Kingman. Kingman likely has the most similar topography. The wind data for all three weather reporting stations is depicted on **Exhibit 3B**.

As depicted on the exhibit, the Kingman weather data results in a 92.12 percent crosswind coverage for 12 mph winds and 95.58 percent for 15 mph winds. Prescott data improves the crosswind coverage at Seligman airport to 94.48 percent for 12 mph crosswinds and 97.09 percent for 15 mph crosswinds. Finally, the Flagstaff weather data yields 98.33 percent for 12 mph crosswinds and 99.41 for 15 mph crosswinds.

Considering all stations, it is very likely that the existing runway orientation is adequate for Seligman Airport most of the time. For this reason, future plans will not consider the construction of a crosswind runway.

Runway Length

The determination of runway length requirements for the airport is based on five primary factors:

- Critical aircraft type expected to use the airport.
- Stage length of the longest nonstop trip destination.
- Mean maximum daily temperature of the hottest month.
- Runway gradient.
- Airport elevation.

An analysis of the existing and future fleet mix indicates that turboprop and small jet aircraft within ARC B-II will be the most demanding aircraft for runway length at Seligman Airport. The typical itinerant business aircraft could range from the Cessna Citation family to Lear Jets, while the turboprops will likely be Beechcraft King Air or Pilatus aircraft.

Aircraft operating characteristics are affected by three primary factors: the mean maximum daily temperature of the hottest month, the airport's elevation, and the gradient of the runway. An increase in the maximum difference in runway centerline elevation increases the runway requirement in large aircraft weighing less than 60,000 pounds, while an increase in haul length of airplanes weighing more than 60,000 pounds will also increase runway lengths for these aircraft.

The mean maximum daily temperature of the hottest month for Seligman Airport is 91.8 degrees Fahrenheit. The airport elevation is 5,237.8 feet MSL (high point on runway). Gradient for Runway 4-22 is 0.23 percent, with the maximum difference in runway elevation being 12 feet.

Table 3B outlines the runway length requirements for various classifications

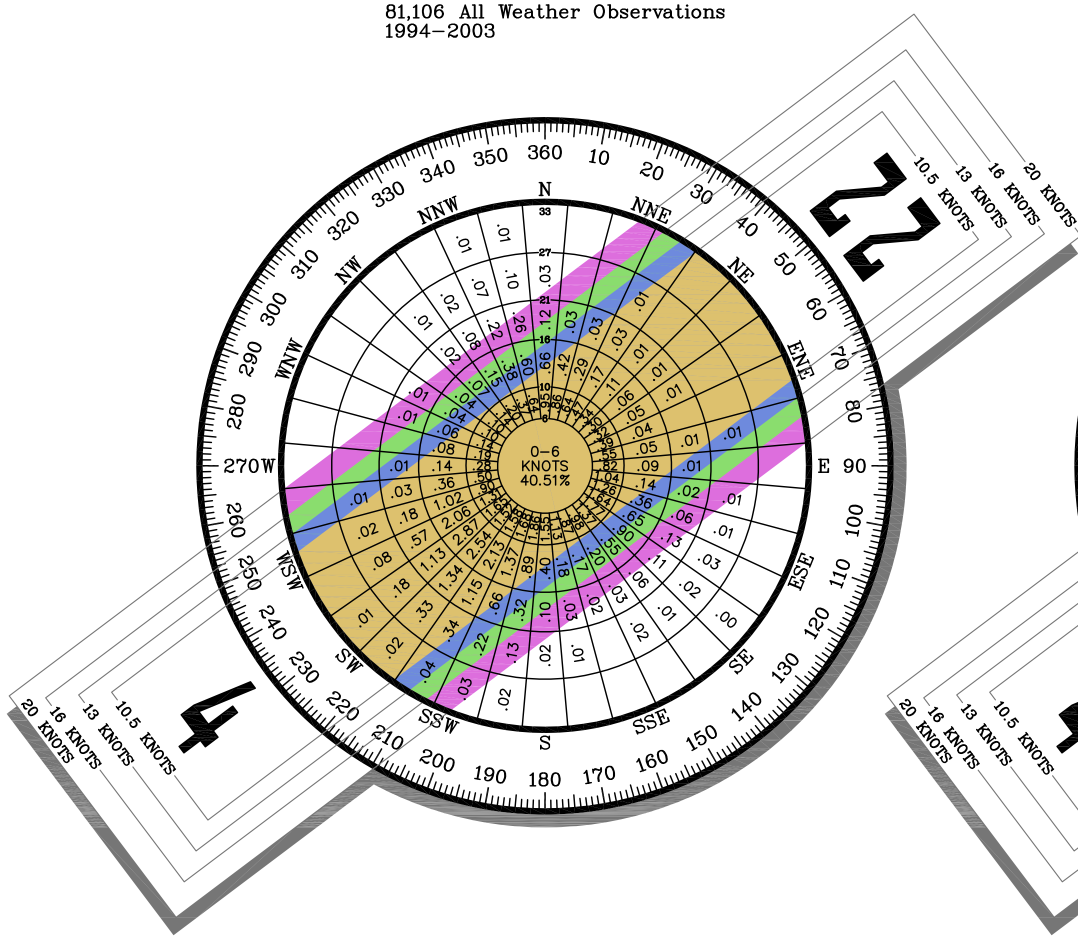
Draft 02MP20-3B-12/21/04

ALL WEATHER WIND COVERAGE

Runway	10.5 Knots 10.5 MPH	13 Knots 10.5 MPH	16 Knots 10.5 MPH	20 Knots 10.5 MPH
Runway 4-22	*92.12%*	*95.58%*	*98.36%*	*99.50%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Kingman Airport (IGM)
Kingman, Arizona

OBSERVATIONS:
81,106 All Weather Observations
1994-2003

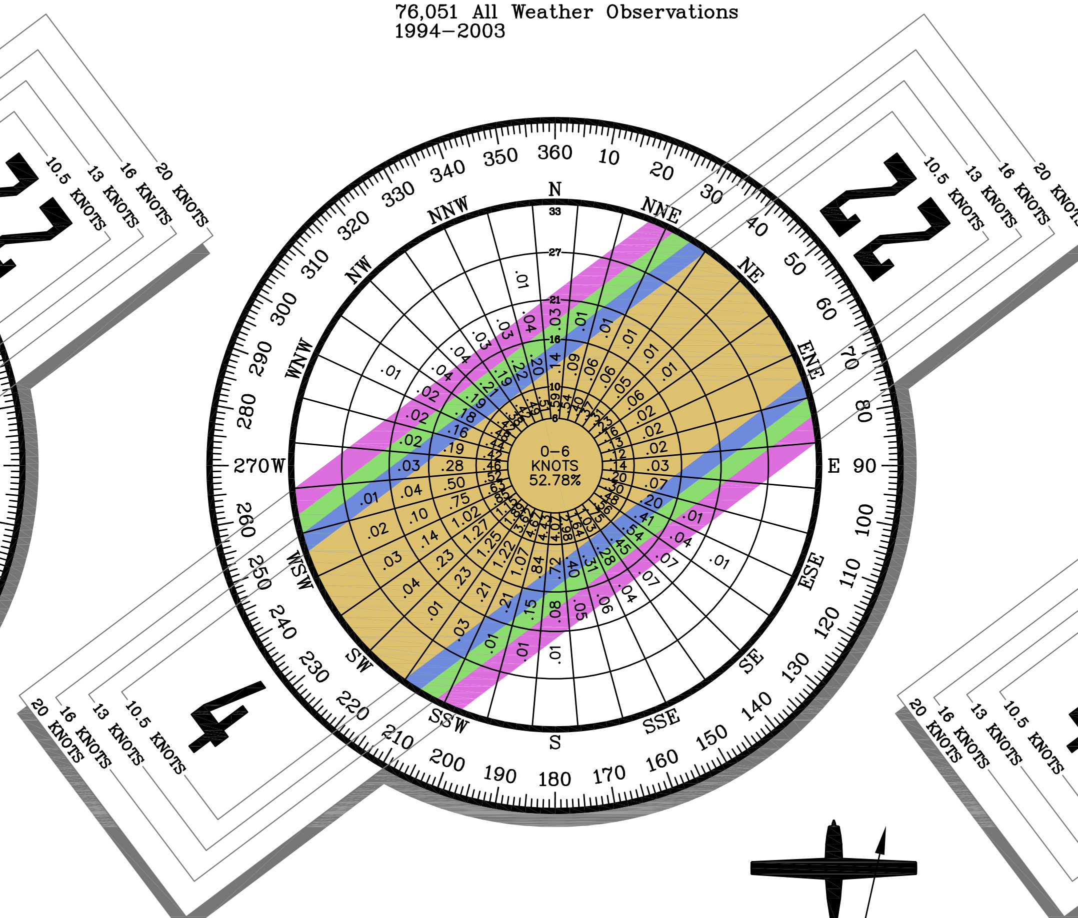


ALL WEATHER WIND COVERAGE

Runway	10.5 Knots 10.5 MPH	13 Knots 10.5 MPH	16 Knots 10.5 MPH	20 Knots 10.5 MPH
Runway 4-22	*94.48%*	*97.09%*	*99.24%*	*99.83%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Ernest A Love Field (PRC)
Prescott, Arizona

OBSERVATIONS:
76,051 All Weather Observations
1994-2003

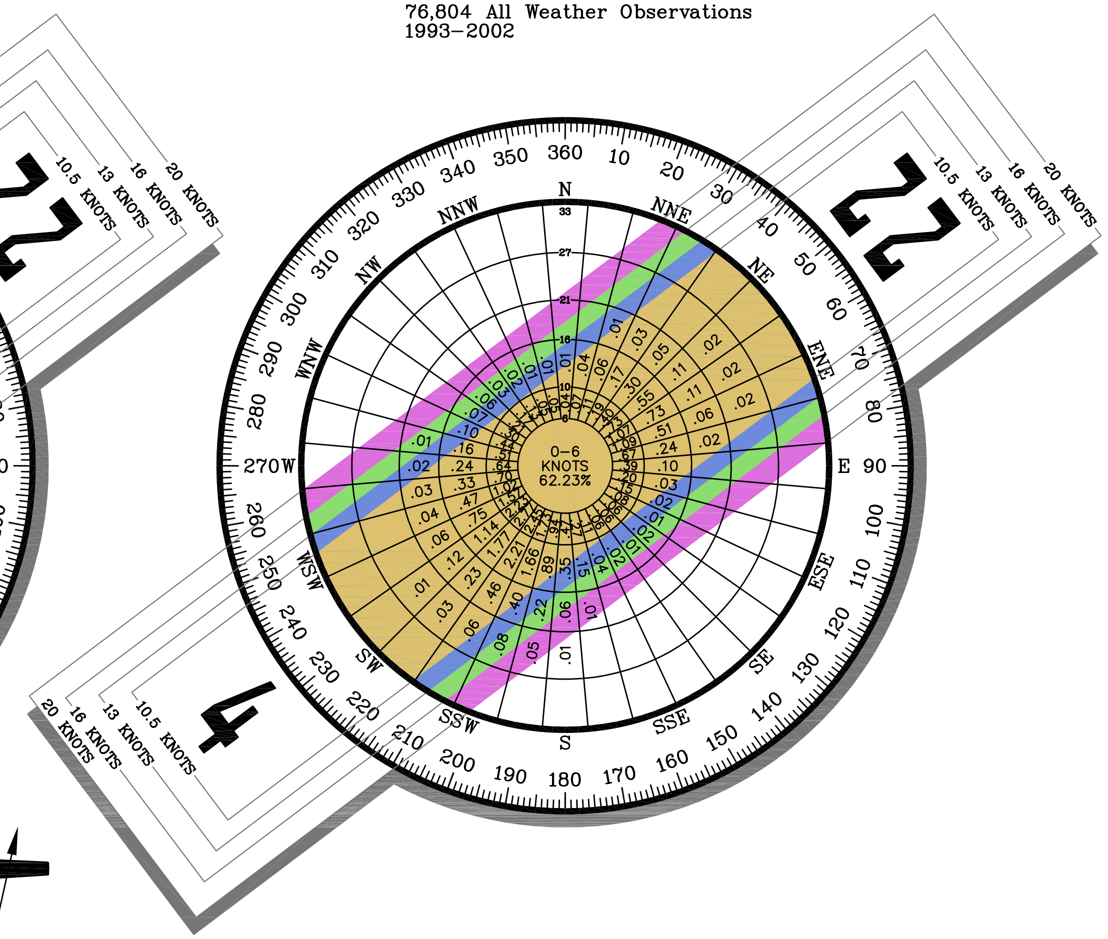


ALL WEATHER WIND COVERAGE

Runway	10.5 Knots 10.5 MPH	13 Knots 10.5 MPH	16 Knots 10.5 MPH	20 Knots 10.5 MPH
Runway 4-22	*98.33%*	*99.41%*	*99.89%*	*99.98%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Flagstaff Pulliam Airport (FLG)
Flagstaff, Arizona

OBSERVATIONS:
76,804 All Weather Observations
1993-2002



Magnetic Variance
12° 32' East (December 2004)
Annual Rate of Change
2' West (December 2004)

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Exhibit 3B
WINDROSES

of aircraft that utilize Seligman Airport. These standards were derived from the *FAA Airport Design Computer Program* for recommended runway lengths. As with other design criteria, runway length requirements are based upon the critical aircraft grouping with at least 500 annual operations.

Based upon the forecast of aircraft fleet mix through the long range planning period, Seligman Airport should be designed to accommodate, at a minimum, 100 percent of small aircraft (ARC B-II aircraft). According to the FAA design program, to fully accommodate these aircraft, the runway length should be at least 6,700 feet. Currently Runway 4-22 is 4,800 feet, which falls short of this requirement. Analysis in the next chapter will further examine the possibility of extending Runway 4-22.

TABLE 3B
Runway Length Requirements
Seligman Airport

AIRPORT AND RUNWAY DATA*	
Airport elevation	5,237 feet
Mean daily maximum temperature of the hottest month	91.8 F
Maximum difference in runway centerline elevation	12 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
* Dry runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	4,800 feet
95 percent of these small airplanes	6,600 feet
100 percent of these small airplanes	6,700 feet
Small airplanes with 10 or more passenger seats	6,700 feet

Source: FAA Airport Design computer program Version 4.2D.

Runway Width

The existing Runway 4-22 width of 75 feet meets FAA design standards for ADG II aircraft. This width is adequate given the forecast level of aviation activity for Seligman Airport.

Runway Strength

The pavement strength for Runway 4-22 has not been published by the FAA. Discussions with County staff indicate that the pavement was designed and constructed to meet 12,500 pounds single wheel (SWL) strength. To have the runway's pavement strength rating published, the County must submit a pavement analysis report, along with a copy of the Airport's FAA 5010 form (highlighting the revision), to the FAA's Western Pacific Region Airports Division Office in Los Angeles, California. FAA publications should reflect this change within six to 12 months of submittal, as the FAA updates their 5010 database approximately twice annually.

The current 12,500 pound SWL strength will be adequate for the majority of aircraft anticipated to utilize the airport. Ultimately, however, the runway pavement strength should be increased to 25,000 pounds SWL. This strength rating is recommended by ADOT for ARC B-II aircraft, and will accommodate all aircraft projected to utilize the airport on a regular basis.

Runway Safety Areas

Consideration of runway length requirements must also factor other design criteria established by the FAA. FAA design criteria regarding runway object free area (OFA), runway safety area (RSA), and height clearances must be considered.

The runway OFA is defined in *FAA Advisory Circular 150/5300-13 Change 5, Airport Design,* as an area centered on the runway extending out in accordance to the critical aircraft design category utilizing the runway. The OFA must provide clearance of all ground-based objects protruding above the runway safety area (RSA) edge elevation, unless the object is fixed by function serving air or ground navigation.

The RSA is also centered on the runway, reaching out in accordance to the approach speed of the critical aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

Analysis in the previous section indicated that Runway 4-22 should currently be designed for ARC B-I aircraft and be planned to ultimately accommodate aircraft in ARC B-II. In order to meet the current design criteria for category B-I aircraft, the cleared and graded RSA would need to be 120 feet wide (centered on the runway) and extend 240 feet beyond each runway end. The OFA is required to be a cleared area 200 feet on each side of the runway centerline, extending 240 feet beyond each runway end. For the ultimate ARC B-II design, the RSA is 150 feet wide, extending 300 feet beyond the runway end. The OFA increases to 500 feet in total width, extending 300 feet beyond the runway ends.

Runway 22 does not conform to ARC B-I standards for RSA length beyond the runway end. Currently, a 10-foot perimeter fence obstructs the RSA to provide only 199 feet of the required 240 feet. Obviously, this obstruction will need to be improved in order to meet ARC B-II aircraft standards. Also, a drainage ditch obstructs the 240-foot RSA width on the Runway 22 end. Both of these obstructions will need to be improved to meet standards and to become eligible for a runway extension as discussed above.

HELIPAD

Originally, Seligman Airport included an on-site, dedicated helipad to serve helicopter operations. The helipad was removed once the runway/taxiway and apron were constructed of asphalt. Given the relatively low amount of aircraft operations forecast for the airport, planning for a dedicated helipad at the airport is unnecessary.

TAXIWAYS

Taxiways are primarily constructed to facilitate aircraft movements to and from the runway system. Parallel taxiways, in particular, serve to enhance airfield capacity and are extremely essential to aircraft movement about an airfield. Some taxiways are necessary simply to provide access between the aprons and runways, whereas other taxiways become necessary as activity increases at an airport, in order to provide safe and efficient use of the airfield. Three crucial elements involved in taxiway design are: taxiway width, separation distance between runways and parallel taxiways, and pavement strength rating.

FAA Airport Design standards for taxiway width and separation distances between runways and parallel taxiways are based primarily on the Airplane Design Group (ADG). Design Group II has been designated for future airfield design. ADG II design standards stipulate a taxiway width of 35 feet and runway/parallel taxiway separation distance of 240 feet.

Parallel Taxiway A and midfield exit Taxiway C are both 35 feet wide, which meets FAA standards for Group II aircraft. Both entrance/exit taxiways B and D, located at either end of the runway, are 80 feet wide, exceeding FAA design standards. The existing runway/parallel Taxiway A separation distance of 240 feet also meets ARC B-II design standards. Future runway consideration should consider the extension of parallel Taxiway A, to follow the addition of runway length. An additional entrance/exit taxiway should be constructed at the extended end of the runway.

The FAA recommends that holding aprons be provided at or near each runway end for ARC B-II runways. These aprons provide aircraft with an area to conduct final checks prior to takeoff. Aircraft which are unable to takeoff due to a malfunction, can be bypassed here by other aircraft ready for takeoff. Typically, holding aprons are designed large enough to accommodate from two to four aircraft, which is dependent on the average size of aircraft utilizing the runway in question. Currently, Taxiways B and D are 80 feet wide and serve as hold aprons. The current design works for ADG I aircraft; however, needs to be larger for full Group II design. The recommended plan may need to consider redesigning the hold aprons for the ultimate ARC B-II design.

The hold lines on all entrance/exit taxiways are currently marked at 125 feet to the side of runway centerline. This distance meets FAA standards for ARC B-I aircraft design. For ARC B-II, however, FAA design standards require the hold lines be placed 200 feet from runway centerline. Thus, the long term plan should consider relocating the hold lines to 200 feet from runway centerline.

NAVIGATIONAL AIDS

Electronic navigational aids are used by aircraft during an approach to an airport. Instrument approach procedures are a series of maneuvers designed by the FAA which utilize navigational aids to assist pilots in locating and landing at an airport, and are especially helpful during inclement weather conditions. Additionally, pilots often use instrument approaches during good visibility conditions. Presently, there are no instrument approaches available at Seligman Airport. Having no instrument approaches means that the airport is effectively closed during poor weather situations when visual flight can no longer be attempted. The closest public use airports providing instrument approach capability are Prescott's Ernest A. Love Field and Flagstaff Pulliam Airport (both approximately 70 miles from Seligman).

Throughout the United States, the increased use of general aviation aircraft for business and corporate aircraft has magnified the need for instrument approaches at noncommercial airports. In order to support this growing segment of general aviation, as well as provide convenient local air access to Seligman and other surrounding communities, it is vital that Seligman Airport is accessible in all weather conditions and that weather-related down time (currently estimated at less than two percent) at the Airport be eliminated to the greatest extent possible. The advent of Global Positioning System (GPS) technology will ultimately provide the capability of establishing instrument approaches at the airport. As discussed in Chapter One, the FAA is proceeding with a program to transition from existing, ground-based navigational aids, to a satellite-based navigation system utilizing GPS technology.

Currently, GPS is certified for enroute guidance and for use with instrument approach procedures. The initial GPS approaches being developed by the FAA provide only course guidance information. In the near future, it is expected that GPS will also be certified for use in providing descent information for an instrument approach. For now, this capability is only available using an Instrument Landing System (ILS). Presently, there are three categories of GPS approaches, each based upon the desired visibility minimum of the approach. The three categories of GPS approaches are: one-half mile, three-quarter mile, and one mile. To be eligible for a GPS approach, the airport landing surfaces must meet specific standards as outlined in Appendix 16 of the FAA Airport Design Circular. The specific airport landing surface requirements which must be met in order to establish a GPS approach, and a comparison of these standards to existing airport facilities are summarized in **Table 3C**. The table reveals that Runway 4-22 currently meets or exceeds the requirements to support a one-mile-visibility minimum GPS approach.

TABLE 3C
GPS Instrument Approach Requirements

Requirement	One-Half Mile Visibility	3/4-Mile Visibility Greater Than 300-Foot Cloud Ceiling	One-Mile Visibility Greater Than 400-Foot Cloud Ceiling	Runway 4-22 Existing
Minimum Runway Length	4,200 Feet	3,200 Feet	3,200 Feet	4,800 Feet
Parallel Taxiway	Required	Required	Not Required	Available Taxiway A
Runway Markings	Precision	Nonprecision	Nonprecision (= 1 mile) Visual (> 1 mile)	Visual
Runway Edge Lighting	High/Medium Intensity	High/Medium Intensity	Medium/Low Intensity	Medium Intensity
Approach Lighting	MALSR	ODALS or similar	Not Required	None
Primary Surface	500 feet clearance on each side of runway	500 feet clearance on each side of runway	250 feet clearance on each side of runway	250 feet clearance on each side of runways

Source: Appendix 16, FAA AC 150/5300-13, Airport Design, Change 7
Notes: MALSR - Medium Intensity Approach Lighting System with Runway Alignment Lighting ODALS - Omni-directional Approach Lighting System

The *Navigational Aids and Aviation Special Services Study*, released in March 1999 by the Aeronautics Division of ADOT, does not recommend the establishment of an instrument approach at Seligman Airport. The study indicated that the runway primary surface and object free area (OFA) were penetrated and the cost to improve the primary surface and OFA would exceed the operational benefits of establishing the approach.

While ADOT did not recommend a GPS approach to Runway 4-22, long term planning should consider a GPS approach. The report notes that the approach is not economically viable, however, if improvements are made (some have been and others are planned), the approach would be feasible. Once the OFA and primary surfaces are cleared (fence relocation), establishment of a GPS approach at Seligman Airport can be accomplished at little or no cost to the Airport. The best choice for the approach would be Runway 22. However, once the obstructions are cleared, both ends may be capable of being served by GPS.

AIRFIELD LIGHTING, PAVEMENT MARKINGS, AND WIND INDICATORS

Airfield lighting and pavement markings assist pilots in locating an airport at night and in poor weather conditions, as well as facilitate aircraft movement on the ground. The current and future requirements for each of these components at Seligman Airport are summarized below.

Identification Lighting: The Airport is equipped with a rotating beacon which assists pilots in locating the airport at night. The existing beacon is adequate and should be maintained in the future.

Visual Approach Lighting: Visual approach lighting systems are configurations of lights which are positioned symmetrically along the extended runway centerline and extend toward the approach. Currently, there are no approach lighting systems located at Seligman Airport. An approach lighting system is not required for the implementation of the recommended GPS approach(es) to Runway 4-22. This condition isadequate regarding the proposed airside improvements presented in this report.

Runway end identifier lights (REILs), in conjunction with runway threshold lights, are installed at each end of Runway 4-22. As discussed in Chapter One, REILs provide positive and rapid identification of the approach end of the runway, and are typically used where approach lighting is unavailable. These existing systems will serve to enhance the recommended GPS approaches at the Airport and should, therefore, be maintained in the future.

Visual Approach Aids: Visual glide slope indicators (VGSI) are a system of lights located at the side of the runway and provide visual descent guidance information to pilots during an approach to the runway. At Seligman Airport, PAPI-2s are provided on the left side, near each end of Runway 4-22. These light systems will also enhance future GPS approaches at the Airport and should be maintained for the future.

Runway Lighting: The purpose of runway edge lighting at an airport is to provide an outline of the runway, thus enabling both nighttime and low-visibility operations. Runway 4-22 is equipped with medium intensity runway lighting (MIRL) which will be adequate for the future.

Taxiway Lighting: Taxiway lighting/illumination at an airport increases the safety and efficiency of aircraft ground movement operations at night. Currently, medium intensity taxiway lighting (MITL) is provided, which will be adequate for the future.

Runway/Taxiway Pavement Markings: The basic (visual) markings of Runway 4-22 denote runway centerline, runway edge, aiming point, and designation number. The runway/taxiway hold lines have been marked at 140 feet from runway centerline. The future hold lines will need to be placed at 200 feet, to meet ARC B-II standards. Taxiway and apron taxilane markings consist of centerline striping only. The existing runway markings are sufficient for the future GPS approaches and should be maintained through the planning period. Any future taxiways at the Airport should be marked to match existing markings at the Airport.

Weather Measurement Equipment: An AWOS (Automated Weather Observing System) is a computerized system that automatically measures one or more weather parameters, analyzes the data, prepares a weather observation that consists of the parameter(s) measured, and broadcasts the observation to the pilot using an integral very high frequency (VHF) radio or an existing navigational aid. The AWOS is a modular system utilizing a central processor which may receive input from several sensors. Basically, there are five standard groups of sensors, however, an AWOS may be certified with any combination of sensors. Dependent upon system design, additional sensors may be certified to any AWOS configuration. For a more detailed description of the standards of AWOS systems and the types of weather sensors available, please reference *FAA Advisory Circular (AC) 150-5220-16C, Automated Weather Observing Systems for Non-federal Applications*, dated December 13, 1999. Additionally, installation criteria are available in *FAA Order 6560.20B, Siting Criteria for Automated Weather Observing Systems (AWOS),* dated July 20, 1998.

At present, there are no weather measurement facilities available at Seligman Airport. Consideration should be given to the installation of an AWOS facility at Seligman Airport. Remotely located, Seligman Airport does not have a nearby airport to provide local weather information.

Wind Indicators: Currently, the airport is equipped with a lighted wind cone/segmented circle near midfield and west of the runway. Supplemental wind cones are also located near each end of the runway. Wind-indicating devices provide pilots with information as to ground-level wind conditions, while segmented circles indicate airport traffic patterns. These facilities are adequate and should be maintained in the future.

CONCLUSIONS

Runway 4-22's current 4,800-foot length can accommodate 75 percent of small aircraft with less than 10 passenger seats. While this is adequate for the bulk of general aviation aircraft presently using the Airport, future planning should examine the possibility of extending the runway to 6,700 feet. This length would accommodate up to 100 percent of small aircraft with less than 10 passenger seats, thus, enabling the airport to serve medical evacuation and business/corporate type aircraft. Alternatives presented in the next chapter will explore the possibility of extending Runway 4-22.

Also recommended is the establishment of a GPS approach to Runway 22. Long term planning should consider the implementation of a similar GPS approach to Runway 4 as well. The ultimate plan will also include the installation of an AWOS to provide local weather conditions, thereby enhancing the planned approach(es).

LANDSIDE REQUIREMENTS

Landside facilities are those necessary for handling of aircraft and passengers while on the ground. These facilities provide the essential interface between the air and ground transportation modes. The capacities of the various components of each area were examined in relation to projected demand, to identify future landside facility needs. These components include:

- Aircraft Storage Hangars
- Aircraft Parking Apron
- General Aviation Terminal Facilities
- Automobile Parking
- Access
- Fuel Storage
- Airport Support Facilities

AIRCRAFT STORAGE HANGARS

The space required for hangar facilities is dependent upon the number and type of aircraft expected to be based at the airport. Future planning utilizes forecast aviation activity in the determination of estimated future hangar requirements. Future hangar development should be based on actual demand, as well as financial investment considerations.

Demand for hangar space at an airport is dependent on such factors as local climate, security, and owner preference. Emerging trends in general aviation aircraft are toward more sophisticated, expensive aircraft. In light of this trend, many owners are turning to hangar space, rather than outside tiedowns. Currently, there are no hangars at Seligman Airport. The airport's only based aircraft is stored in a private facility off of airport property.

In the future, aircraft storage requirements at the Airport will likely be met by a combination of hangar types, which is dependent in large part, upon aircraft owner demand and preferences. Projected future hangar requirements for Seligman Airport are summarized in **Table 3D**.

For the sake of this analysis, it is assumed that all aircraft will desire hangar space in the future. A planning standard of 1,200 square feet for single-engine aircraft and 2,000 square feet for multi-engine and rotor aircraft was used to determine aircraft storage hangar requirements. Aircraft maintenance area was derived as 15 percent of all hangar spaces.

The first assumption made in this analysis is that T-hangars would be first desired. Small aircraft owners typically prefer T-hangar or shade hangar space, as it is commonly less expensive to lease and provides individualized storage. It is less likely, however, that a T-hangar facility would be constructed first at Seligman. In all likelihood, a larger conventional hangar will be constructed that will provide community storage and may also house a maintenance provider. Thus, the only alternative in the near term could be a conventional hangar. Preferences, however, will likely favor a T-hangar, thus, the assumption in **Table 3D**.

TABLE 3D
Aircraft Storage Hangar Requirements

		Future Requirements		
	2003	**Short Term**	**Inter. Term**	**Long Term**
Aircraft to be Hangared	1	2	4	10
T-Hangar/Shade Hanger Positions	0	2	3	6
Conventional Hangar Positions	0	0	1	4
Hangar Area Requirements				
T-Hangar Area (s.f.)	0	1,900	3,600	7,200
Conventional Hangar Storage Area (s.f.)	0	0	2,000	8,000
Total Maintenance Area (s.f.)	0	300	800	2,300
Total Hangar Area (s.f.)	0	2,200	6,400	17,500

Total hangar requirements in the future will call for the construction of a large conventional hangar, likely 100-feet by 100-feet, or two smaller 80-feet by 80-feet hangars. Also, at some point a T-hangar facility providing six, eight, or ten individual storage units will be constructed. It is not uncommon for a shade hangar to be constructed first, then enclosed to become a T-hangar at a later date.

Dependent on Airport sponsor and aircraft owner preferences and demand, space allocated to future T-Hangar requirements could be shifted to the construction of T-Shades (covered tiedowns) instead. Not only are T-Shades less expensive to construct and maintain, they offer the private aircraft owner a low-cost alternative to enclosed hangar leasing. Alternatives presented in Chapter Four will examine the options available for future hangar development at the airport, and determine the best location for each type of hangar facility.

AIRCRAFT PARKING APRON

A parking apron should be provided for at least the number of locally-based aircraft that are not stored in hangars, as well as transient aircraft. The apron at Seligman Airport is not used by based aircraft, and is not formally divided into local and transient parking positions. The current apron provides approximately 9,300 square yards of space and 16 tiedown positions.

Future total apron area requirements were determined by applying a planning criterion of 800 square yards per transient aircraft parking position and 650 square yards for locally-based aircraft parking position (both include a factor for taxilanes). The results of this analysis are presented in **Table 3E**. It should be noted that the analysis considered that based aircraft will occupy two spaces, while the hangar analysis considered all aircraft hangared. It is important that the apron be capable of accommodating aircraft maintenance operations which will require apron storage. For this reason, the based aircraft total of two was applied for each planning horizon.

Based upon the above planning criteria and the number of assumed transient and based aircraft users, the number of existing tiedowns will more than cover future demand throughout the planning period. However, additional apron area may be required as new hangar areas are developed on the airport which are not contiguous with the existing apron area.

TABLE 3E
Aircraft Parking Apron Requirements

	2003	Short Term	Inter. Term	Long Term
Transient Aircraft Positions		2	3	5
Apron Area (s.y.)		1,600	2,400	4,000
Locally-Based Aircraft Positions	0	2	2	2
Apron Area (s.y.)	0	1,300	1,300	1,300
Total Positions	16	4	5	7
Total Apron Area (s.y.)	9,300	2,900	3,700	5,300

GENERAL AVIATION TERMINAL FACILITIES

General aviation terminal facilities serve several functions at an airport. These functions can include providing passenger waiting areas, a pilots' lounge and flight planning area, restrooms, food and beverage concessions, administrative and management offices, storage, plus various other needs. The area required for these facilities is not necessarily limited to a single building, but also includes the space used by fixed base operators for similar functions and services.

General aviation terminal facility needs are, for the most part, a function of fixed base operator (FBO) needs. Typically, an FBO which constructs a large aircraft storage and maintenance hangar, will also construct pilot and passenger facilities adjacent to the hangar. This may fulfill some of the Airport's projected terminal requirements, therefore, eliminating the necessity of constructing a single building designed to satisfy general aviation terminal needs.

The methodology used in estimating general aviation terminal facility needs was based on the number of airport users expected to utilize general aviation facilities during the design hour. Future space requirements were then based upon providing 90 square feet per design hour itinerant passenger. **Table 3F** outlines these future requirements for general aviation terminal services at Seligman Airport throughout the planning period. It should be noted that the airport is not supported by an on-airport FBO or specialty operator. Also, ADOT recommends the construction of a terminal building providing 600 square feet of space for ARC B-II airports. For these reasons, short term planning should consider upgrading the current restroom facility into a public use terminal building. The facility should include vending machines for food items, and telephone (now provided outdoors). The facility should also provide other pilot services such as weather briefing and lounge areas. If an AWOS were installed, the terminal machine could be located in the terminal building.

AVIATION SUPPORT FACILITIES

Certain facilities that do not logically fall under classifications of airfield, terminal building, or general aviation have been identified for inclusion within this Master Plan. Facility requirements, where applicable, have been identified for the following facilities:

- Airport Access and Vehicle Parking
- Fuel Storage
- Aircraft Wash Rack/Maintenance Facility
- Public Utilities
- Other Facilities

TABLE 3F
Terminal Building Requirements
Seligman Airport

		Future Requirements		
	Existing Space Available	**Short Term**	**Intermediate Term**	**Long Term**
Design Hour Passengers	--	2	4	5
Building Space (s.f.)	±180	180	360	450

AIRPORT ACCESS AND VEHICLE PARKING

As discussed in Chapter One, the main access to Seligman Airport is provided by Historic Route 66 and/or U.S. Interstate 40 immediately south of the airport. From Historic Route 66, Airport Access Road leads to both the gated aircraft parking apron and automobile parking lot, located immediately southwest of the apron. The existing airport access is adequate and should be maintained in the future.

Designated, marked vehicle parking at the Airport consists of 15 paved parking spaces located directly southwest of the aircraft apron. Automobile parking requirements for future terminal area activities have been determined using a planning standard of 1.8 spaces per design hour passenger, and 400 square feet for each parking position. Additionally, general aviation parking requirements are calculated under the assumption that up to half of the based aircraft will require automobile parking at any one time. The parking area required per space is the same that is used in terminal area activities parking requirements. Future vehicle parking requirements for Seligman Airport are presented in **Table 3G**.

TABLE 3G
Vehicle Parking Requirements
Seligman Airport

	Existing	Short Term	Intermediate Term	Long Term
Design Hour Passengers		2	4	5
Terminal Vehicle Spaces		4	7	9
Parking Area (s.f.)		1,440	2,880	3,600
General Aviation Spaces		1	2	5
Parking Area (s.f.)		400	800	2,000
Total Airport Parking Spaces	15	5	9	14
Total Airport Parking Area (s.f.)	±4,900	1,840	3,680	5,600

FUEL STORAGE

The airport does not currently provide fueling services. Future planning should consider the installation of fuel storage and dispensing devices. At a minimum, AvGas, or 100LL fuel should be provided. In the long term, consideration could be given to adding Jet A fuel capacity.

An airport's fuel storage requirements can vary based upon individual supplies and distributor policies, therefore, future fuel storage requirements for Seligman Airport will be dependent upon the independent distributor. At a minimum, consideration should be given to constructing a facility capable of accommodating a full truckload of fuel, or 8,000 gallon capacity. Due to environmental considerations, the fuel tank should also be located aboveground, with double wall construction and containment enhancements.

Many airports similar to Seligman have had self-serve facilities with credit card readers installed. These facilities require no staffing to dispense fuel, and provide a valuable service to the aviation community. For planning purposes, short term improvements will consider the installation of fueling facilities. Long term consideration will be given to Jet fuel facilities.

AIRCRAFT WASH RACK/ MAINTENANCE FACILITY

The presence of a designated aircraft wash rack/maintenance facility at an airport offers convenience to the individual aircraft owner and allows the airport sponsor to monitor and maintain their environmental compliance responsibilities. These areas typically provide for the collection of used aircraft oil and other hazardous materials, as well as provide a covered area for aircraft washing and light maintenance. Presently, there is no such designated facility at Seligman Airport. Any future facility should be large enough to accommodate, at a minimum, ADG I aircraft (49 foot wingspan). Additionally, an enclosed or covered structure should include a minimum 20-foot tail height clearance. The location of the aircraft wash rack/maintenance facility should be convenient to both aircraft storage and maintenance hangars, as well as the aircraft parking aprons. Furthermore, this facility should comply with all applicable waste water recovery/disposal, as well as hazardous material collection/disposal practices and procedures.

PUBLIC UTILITIES

Electrical, water, and septic services are available at the airport. The existing water line into the airport is limited and would need upgrading for additional facility usage. Natural gas lines abut airport property, however, were not extended onto the airport. Sanitary sewer lines have not been extended from the Town of Seligman. The Town's line is somewhat small and may not be capable of ever serving the airport. Construction of new facilities such as hangars, etc., however, will likely require new utility extensions to primary service lines and should be included in future design estimates.

OTHER FACILITIES

As it has no immediate future plans for scheduled airline passenger service, Seligman Municipal Airport is exempt from Federal Aviation Regulation (FAR) Part 139 Standards and is not required to have aircraft rescue and firefighting (ARFF) equipment on site.

CONCLUSIONS

Landside facility requirements are illustrated on **Exhibit 3C.** To meet future forecast demand, an increase in available T-hangar/T-Shade space and the development of additional conventional hangar space will be required through the planning period. Dependant on their location, additional apron area may need to be constructed to accommodate the development of these new hangars. Aircraft parking apron needs will not likely surpass the existing facility, however, new facilities may be needed as hangars are constructed.

The airport is not served by a terminal building. Planning should consider the construction of a terminal building. General aviation parking needs appear to be sufficient to meet future needs. Future planning must consider the installation of fuel storage and dispensing devices. Short term needs would include a self-serve AvGas facility, while long term consideration should be given to adding Jet A fuel facilities.

Given the current and future projected levels of activity at the airport, the existing vehicle access is adequate. Finally, future planning should consider locating an aircraft wash rack/ maintenance facility at the Airport. Such a facility can benefit both the individual aircraft owner and airport sponsor as well.

SUMMARY

A summary of airside and landside requirements is presented on **Exhibit 3C**. The purpose of this chapter has been to identify the facilities required to meet potential aviation demands projected for Seligman Airport throughout the 20-year planning horizon. The next step is to develop a direction for development that can best meet these projected needs. The remainder of this master plan will focus on outlining this direction, its schedule, and costs.

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	AVAILABLE	SHORT TERM	INTERMEDIATE TERM	LONG TERM
RUNWAYS AND TAXIWAYS				
	**Runway 4-22** 4,800' x 75' 12,500# SWL Full-length parallel txwy 3 exit taxiways	**Runway 4-22** Improve Rwy. 22 RSA	**Runway 4-22** Same	**Runway 4-22** 6,700' x 75' 25,000# SWL Add: entrance/exit taxiway
NAVIGATIONAL AIDS & LIGHTING				
	Airport Beacon Wind Cone/ Segmented Circle MIRL, MITL, PAPI-2L	Same Add: GPS to Rwy. 22 AWOS	Same Same	Same Same
AIRCRAFT STORAGE & TIEDOWNS				
	**T-hangars/ Shade Hangars** N/A **Conventional Hangars** N/A **Maintenance Area** 0 s.f. **Apron** 16 Positions 9,300 s.y.	**T-hangars/ Shade Hangars** 2 Positions 1,900 s.f. **Conventional Hangars** 0 Positions 0 s.f. **Maintenance Area** 300 s.f. **Apron** 4 Positions 2,900 s.y.	**T-hangars/ Shade Hangars** 3 Positions 3,600 s.f. **Conventional Hangars** 1 Position 2,000 s.f. **Maintenance Area** 800 s.f. **Apron** 5 Positions 3,700 s.y.	**T-hangars/ Shade Hangars** 6 Positions 7,200 s.f. **Conventional Hangars** 4 Positions 8,000 s.f. **Maintenance Area** 2,300 s.f. **Apron** 7 Positions 5,300 s.y.
TERMINAL SERVICES				
	**Terminal Building Space** 180 s.f. **Auto Parking** 15 Spaces 4,900 s.f. **Fuel Storage** JetA: N/A Avgas: N/A	**Terminal Building Space** 180 s.f. **Auto Parking** 5 Spaces 1,840 s.f. **Fuel Storage** JetA: N/A Avgas: Self-serve 8,000 gal. minimum	**Terminal Building Space** 360 s.f. **Auto Parking** 9 Spaces 3,680 s.f. **Fuel Storage** JetA: N/A Avgas: Same	**Terminal Building Space** 450 s.f. **Auto Parking** 14 Spaces 5,600 s.f. **Fuel Storage** JetA: 8,000 gal. Avgas: 12,000 gal. minimum

KEY:

AWOS - Automated Weather Observation System
GPS - Global Positioning System
MIRL - Medium Intensity Runway Lighting
MITL - Medium Intensity Taxiway Lighting
PAPI - Precision Approach Path Indicator
SWL - Single Wheel Landing Gear

SELIGMAN AIRPORT

Exhibit 3C
FACILITY REQUIREMENTS SUMMARY